

aspects *in* anesthesia

ASA
2006

Aspects in Anesthesia, Chicago, 2006

The beautiful city of Chicago, on Lake Michigan, welcomed a record 18 470 attendees to the 59th annual meeting of the American Society of Anesthesiologists (ASA), October 14–18, 2006. The meeting was held at North America's largest convention center, McCormick Place, allowing the society to host 1752 scientific papers, almost 200 refresher course lectures, 300 problem-based learning discussions and 85 workshops, in addition to the trade exhibition of 275 companies. The 60th ASA annual meeting will be held in San Francisco, October 13–17, 2007.

Benefits of monitoring the depth of anesthesia



Karen B Domino

Prevention of awareness

Despite increasing recognition of the phenomenon of awareness in anesthesia, around 100 patients per day in the US still wake up during surgery. Professor Karen B Domino (Seattle, WA) observed that, while none of the current monitoring techniques is completely effective at determining depth of anesthesia, bispectral index (BIS) monitoring can reduce the incidence of awareness compared with routine care, and may be used as an adjunct to

other available indicators of anesthetic depth. In addition, a pre-operative equipment check is paramount. Premedication with amnestic agents may also help, as well as re-dosing with hypnotics in high-risk cases, and a minimum alveolar concentration of volatile anesthetic of at least 0.6 should be considered.

The ASA Practice Advisory for intra-operative awareness indicates that patients considered to be at elevated risk of awareness should actually be informed of this risk. Such patients include those with a history of substance abuse, previous episodes of intra-operative awareness, high-dose opioid use, and ASA physical status 4 or 5. Particular types of surgery are also associated with increased risk of awareness, such as cardiac, trauma and emergency surgery, while the use of neuromuscular blocking agents (NMBAs) removes the ability of the patient to move and thereby indicate awareness. The ASA Advisory states that intra-operative monitoring of anesthetic depth should be carried out on a case-by-case basis for selected patients, and should rely on multiple modalities.



Daniel J Cole

Other benefits

Monitoring of anesthetic depth may also have other benefits, said Professor Daniel J Cole (Phoenix, AZ). For example, BIS monitoring in ambulatory anesthesia has been associated with a 19% reduction in anesthetic use, a 4-min reduction in post-anesthetic care unit (PACU) stay, and a 6% lower incidence of nausea and vomiting. Elsewhere, BIS-guided anesthesia was shown to reduce the risk of post-operative cognitive dysfunction (POCD). A prospective

observational study also found that 1-year mortality increased by 24.4% for every hour during anesthesia that BIS was <45. It is therefore possible that BIS monitoring may facilitate adequate levels of anesthesia to prevent awareness, while avoiding the deep levels of anesthesia that can be associated with adverse effects.



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Anesthesia and the aging brain



Gregory Crosby

The brain inevitably changes as we age, and becomes increasingly vulnerable to peri-operative delirium and POCD. The risk of delirium is particularly increased in the elderly, combined with dementia, sensory deficits or depression, and after major orthopedic, cardiac or emergency surgery. While the mechanism is currently unknown, said Dr Gregory Crosby (Boston, MS), it is hypothesized that peri-operative delirium may be related to additional decreases in already depleted levels of neurotransmitters in the aging brain. Agents, such as ketamine and benzodiazepines, are known to produce delirium in some patients. Anesthesiologists should identify patients at high risk, treat the underlying condition where possible, and provide a supportive re-orientation program.

The cause of prolonged POCD is also unknown, said Dr Crosby, but is likely to be multifactorial. A large international study suggested that neither peri-operative hypotension nor hypoxia were predictors of cognitive decline 3 months post-operatively, and the role of pre-existing cognitive status is currently unknown. Anesthesia itself may be responsible, either by delayed clearance of agent from the brain or through neurotoxicity such as apoptotic neurodegeneration. At present however, there is no rational basis for recommending one specific anesthetic technique or agent over another. A simple general rule should be to recognize that the elderly are often cognitively frail and to "give no more than necessary".

Aging clearly affects the anesthesiologist as well as the patient, and there is evidence that age-related physical and attitudinal changes may affect "fitness for duty", said Dr Crosby. However, there is no clear evidence that outcomes differ between patients of older and younger physicians. A number of self- or externally imposed modifications for the older anesthetist may be appropriate, including shorter shifts, fewer hours, avoiding complex cases, and concentration on a sub-specialty.

Anesthetic implications of the graying of America



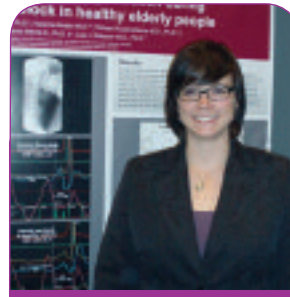
Kathryn E McGoldrick

The rapidly growing elderly population in developed countries has profound implications for anesthesiologists and surgeons, as well as other clinicians, said Professor Kathryn E McGoldrick (Valhalla, NY). Not only are the elderly more likely to require surgical procedures, but peri-operative morbidity and mortality remains higher compared with younger patients, despite improvements in recent decades. In general, the elderly are particularly sensitive to the stresses of trauma, hospitalization, and surgery. The functional capacity of organs decreases with age, and comorbidities contribute further to the decline, with an increasing prevalence of cardiovascular, respiratory and other disorders.

"Minimizing peri-operative risk in the elderly requires thoughtful pre-operative assessment of organ function and reserve, meticulous intra-operative management of co-existing disorders, maintenance of normothermia, and vigilant post-operative monitoring and pain control"

Age-related alterations in nervous system function have especially compelling implications for anesthetic management, since virtually every anesthetic drug targets this system. For example, elderly patients require less propofol for induction, and hypotension is more likely even with an appropriate dose reduction. Furthermore, time to clinical recovery from neuromuscular blockade (NMB) is markedly increased for non-depolarizing agents that undergo organ-based clearance from plasma. Use of shorter-acting anesthetic

agents (eg, propofol, desflurane, sevoflurane), together with BIS monitoring, can provide more rapid emergence in the elderly patient. For ambulatory surgery, randomized studies have clearly shown that regional anesthesia is



Dr Anna Hardemark (Sweden) presented a poster showing that partial neuromuscular blockade in healthy older people is associated with profound pharyngeal dysfunction and a high risk of aspiration

superior to general anesthesia in the elderly, while neuraxial, plexus or nerve blocks may be associated with increased risk of persistent numbness and other complications. Peri-operative maintenance of normothermia has been shown to decrease cardiac morbidity by 55%, while effective post-operative analgesia can decrease the incidence of myocardial ischemia and pulmonary complications. The risk of POCD is also increased in the elderly, particularly in those undergoing major or orthopedic procedures compared with minimally invasive surgery, but it remains unclear which patient populations are most vulnerable.

Interventional procedures for chronic spinal pain

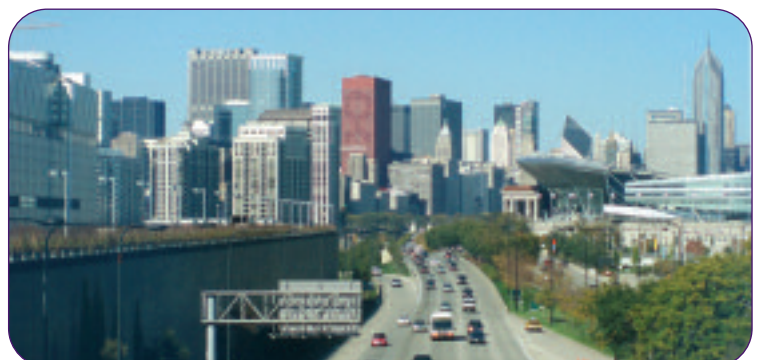


Nagy A Mekhail

Back pain is the leading cause of chronic disability, and its management is complicated by the variability of care by specialty, with neurologists, rheumatologists, neurosurgeons and pain management clinics all offering different advice and strategies. Assessment of novel procedures is also difficult, partly because of the diversity of patients, but also because randomized, controlled trials in these populations are hard to design. Dr Nagy A Mekhail (Cleveland, OH) presented an evidence-based analysis of two new interventional procedures for chronic spinal pain: intradiscal thermal annuloplasty (IDTA) and spinal cord neurostimulation (SCS).

IDTA involves applying thermal energy to the outer annulus of the symptomatic vertebral disc. The theory is that high temperature causes thermal ablation of afferent nociceptors and also causes collagen fibers to contract, thereby debulking the disc volume and affording greater structural stability. The results of published studies indicate significant improvements in pain scores with IDTA, and that better results are achieved in patients with one or two levels of symptomatic degenerative disc disease than those with multilevel disease. Although IDTA is a percutaneous, minimally invasive technique, it does carry some risk of complications, such as infection and damage to the segmental nerves, but these can be minimized by careful patient selection and good technique.

The original postulated mechanism of action of SCS was through Melzack and Wall's gate control theory. It has since been shown that SCS also increases endogenous endorphin release by >71%, and that it inhibits sympathetic activity, with evidence that it can reverse vasospasm induced by a crush injury, and increase transcutaneous oxygen tension. Studies indicate that, with proper patient selection, SCS can significantly reduce pain, improve quality of life and disability scores, and may also result in significant savings in healthcare utilization. Mechanical complications of SCS, such as electrode migration, have decreased significantly in the past decade with technological advances, said Dr Mekhail, while patient education plays a major role in decreasing the infection rate.



What is the future for reversal of non-depolarizing neuromuscular blockade?



James Eisenkraft

What are the side effects and other limitations of acetylcholinesterase inhibitors?

Acetylcholine (ACh) is released pre-synaptically from cholinergic nerve terminals and acts on both nicotinic (nAChRs) and muscarinic acetylcholine receptors (mAChRs). Professor James Eisenkraft

(New York, NY) pointed out that Griffith and Johnson (1942) first used tubocurarine to produce muscle relaxation during anesthesia by competitive reversal of AChRs. Since then acetylcholinesterase inhibitors (AChEIs) have been developed to reverse the effects of NMBAs by preventing the breakdown of ACh at the neuromuscular junction, thereby increasing its relative concentration. The AChEIs, which include edrophonium, neostigmine and pyridostigmine, affect both pre- and post-synaptic AChRs. While acting at the neuromuscular junction and affecting reversal, the AChEIs also cause muscarinic side effects, which include bradycardia, arrhythmias, asystole, hypotension and coronary vasospasm. AChEIs also increase gastrointestinal (raising pH), salivary and bronchial secretions, increase gut motility and cause bronchoconstriction. It is difficult to reverse profound NMB with edrophonium; although this can be improved to some extent with neostigmine; however, repetitive administration of neostigmine may cause increased NMB, as shown by a decrease in the train-of-four (TOF) ratio.

In summary, the benefits of reversal by AChEIs outweigh the risks provided that NMB is adequately monitored, spontaneous recovery is assessed before using the NMBA, contra-indications to reversal are considered, and recovery is fully monitored.



Aaron Kopman

Defining satisfactory recovery from neuromuscular block

Professor Aaron Kopman (New York, NY) described various methods for determining recovery from NMB. In 1975 a TOF ratio of 0.7 became the gold standard for recovery, but later research on volunteers showed that there was still residual paralysis at this level of recovery, eg, the facial muscles remained partially paralyzed and subjects

could not drink through a straw. All the volunteers had diplopia below a TOF ratio of 0.9, and in 50% of them it was still present even at a TOF ratio of 1.0, after which it took a further 45–90 min for all visual disturbances to disappear. The tongue depressor test was the most sensitive objective clinical test, but was not passed by all subjects until a TOF ratio of 0.9 was achieved. It was much more sensitive than the head lift test. For the same volunteers, grip strength was only 53% of normal at a TOF ratio of 0.7, but increased significantly ($P < 0.01$) to 83% at a TOF ratio of 0.9. Evidence of residual blockade is often observed in the recovery room and it is clear that pharyngeal function and control of the airway do not return to normal until a TOF ratio of 0.9 is achieved. Thus, objective neuromuscular monitoring with acceleromyography should be used whenever a non-depolarizing NMBA is administered.

A TOF ratio <0.7 represents potentially clinically significant residual blockade.

At a TOF ratio <0.9 signs and symptoms of residual blockade persist.

AChEIs have a ceiling as to the amount of blockade that they can promptly reverse, and this approximately corresponds to the reappearance of the fourth response to TOF stimulation. A new paradigm for reversal is therefore required and the modified γ -cyclodextrin sugammadex has recently been shown to allow rapid reversal from any depth of blockade within 3 min.



Mark Abel

Structure and action of sugammadex

Traditional NMBAs work by passive diffusion, competitive inhibition and enzymatic action, which allow the NMBA to diffuse away from the neuromuscular junction. The modified γ -cyclodextrin, sugammadex, may change the way in which NMBA reversal is achieved, reported Dr Mark Abel (Bronx, NY). Cyclodextrins have a

hydrophobic internal environment and a hydrophilic exterior. They are not readily metabolized and are excreted intact via the kidney. In effect, they are solubilizing agents that are capable of encapsulating steroid molecules. The sugammadex ring has eight glucose units, and aminosteroid NMBA molecules such as rocuronium or vecuronium are bound into the structure by electrostatic forces which hold the hydrophobic steroid portion of the NMBA molecule in place. The cavity of sugammadex is specifically tailored to accommodate the steroid portion of the aminosteroid, using Van der Waal's forces on long alkyl side chains to hold the cavity open by electrostatic repulsion. Thus, irreversible, one-to-one, specific complexes are formed between sugammadex and rocuronium or vecuronium. The presence of an appropriate level of sugammadex in the plasma allows withdrawal of the aminosteroid molecules from the extracellular space. This process occurs rapidly and even profound rocuronium-induced (1.2 mg/kg) NMB can be reversed to a TOF ratio of 0.9 in 2 min using sugammadex ≥ 12 mg/kg.



Scott B Groudine

How will sugammadex alter the choice of muscle relaxants in the future?

According to Professor Scott B Groudine (Albany, NY), the ideal muscle relaxant should have the following qualities: rapid onset, flexible duration of action (controllable), no histamine release, low cost, be easy to store and administer, have no significant drug interactions and be useful in all

types of patients, including those with renal and hepatic failure. The depolarizing muscle relaxant, succinylcholine, has both a fast speed of onset and a short recovery time, but is associated with bradycardia and potassium release from muscle, and may trigger malignant hyperthermia (MH) in susceptible individuals. In contrast, the non-depolarizing agents, with the exception of rocuronium, have a slower onset and a longer recovery time; rocuronium has a fast onset, and a relatively short recovery time that depends on the initial dose, timing of administration, and the reversal agent used.

Sugammadex is the first of a new class of selective relaxant binding agents (SRBAs), and can be administered any time after rocuronium administration to reverse any depth of blockade. Furthermore, the efficacy of sugammadex does not appear to be influenced by the general anesthetic regimen used. Sugammadex is specific for the non-depolarizing aminosteroid NMBAs rocuronium and vecuronium, and does not reverse NMB induced by succinylcholine or benzylisoquinolinium compounds. However, if after recovery the patient requires a further period of NMB, then benzylisoquinolinium compounds such as atracurium can be used safely.

Sugammadex allows flexibility in the use of rocuronium for the duration of surgery, which may last from 5 min to several hours, but can be rapidly reversed as required. Another new development is gantacurium, a NMBA; however, it induces histamine release in some patients and requires continuous infusion giving it a less flexible administration schedule compared with sugammadex.

In summary, sugammadex gives anesthesiologists the ability to fully reverse NMB at any depth of blockade at any time, and also gives an unparalleled level of control and safety for patients.

25th Anniversary of the Malignant Hyperthermia Association



Ronald S Litman

The Malignant Hyperthermia Association of the United States (MHAUS) celebrated its 25th anniversary with a reception during the ASA meeting. The disease has a genetic origin and can be triggered by succinylcholine and/or volatile anesthetics. Papers presented during the ASA meeting included one by Dr Ronald S Litman and colleagues (Philadelphia, PA), in which the relative incidence and clinical characteristics of MH were analyzed. Post-operative MH was infrequent, and in all cases occurred within 10 min of discontinuation of the

triggering anesthetic agents. No patients with MH presented with an isolated high temperature. A further paper from Professor Sheila M Muldoon and co-workers (Bethesda, MD) retrospectively reviewed 52 patients with heat/exercise-induced rhabdomyolysis (HER) and showed that 42% of them were MH susceptible. Thus, patients with a history of HER should receive non-triggering anesthetics and NMBAs, unless MH susceptibility has been ruled out.



Dr Henry Rosenberg,
President of MHAUS

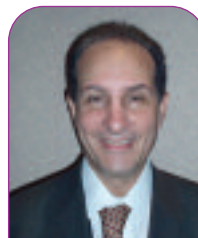
MHAUS can be contacted at
<http://www.MHAUS.org>

for brochures and information on MH.



Sheila M Muldoon

Brain and spinal cord monitoring



Marc J Bloom

The brain is extremely sensitive to hypoperfusion – if cerebral blood flow drops by more than 10%, functional impairment can be detected on testing. At 50% of normal blood flow, impairment is obvious and at around 30% there is loss of electrical function. Neurological status changes very rapidly and injury rapidly becomes irreversible, said Dr Marc J Bloom (New York, NY). Monitoring the brain is useful for modulating the anesthetic dose and detecting injury to the central nervous system

before it is too late. It is particularly important in intensive care patients, and especially in those receiving relaxants.

Dr Bloom described a variety of monitoring methods. Use of a Transcranial Doppler, which measures blood velocity and detects emboli or vasospasm, allows immediate assessment of therapy. However, measurements are not possible in all patients and the device does not measure actual flow. Jugular venous bulb oxygen saturation (SjvO₂) monitoring is helpful to assess therapy for raised intracranial pressure and to evaluate hyperventilation and perfusion, but placement is technically demanding. Near infra-red spectroscopy is a possible non-invasive alternative to SjvO₂ for the detection of regional ischemia, but is limited by hair. A xenon computerized tomography scan gives exquisitely localized cerebral blood flow measurement, said Dr Bloom, but does require the patient to be able to breathe <60% oxygen. Evoked potentials (EPs) can be used to detect ischemia, and allow early intervention and assessment of therapy, providing a guide to 'protection measures'. For example, in carotid surgery, EPs can identify patients unable to tolerate temporary carotid clamping without a shunt; in brainstem and cervical surgery, they can help distinguish between global and local insult. Spinal cord function can also be monitored peri-operatively using sensory or motor EPs.



In order to maximize EP interpretability, it is best to avoid physiologic changes during anesthesia, and infusions are preferable to bolus drugs, said Dr Bloom. The "best" anesthetic varies between patients; however, total intravenous anesthesia is generally better than inhalational agents. Relaxants decrease response amplitudes, but partial paralysis is possible for patient safety. Electroencephalograms (EEGs) are valuable for determining optimal drug dose, and allow faster assessment at the end of surgery and easier non-relaxant management. However, an EEG does not detect cerebral ischemia and is definitely not a replacement for clinical judgment.



Reflections of Chicago in the 100 ton Cloud Gate sculpture - Millennium Park

Safety and quality in ambulatory anesthesia



Lucinda L Everett

A staggering 44 000 deaths from medical error occur annually, according to the 1999 Institute of Medicine report. Most of these result from faulty systems, processes or conditions that lead individuals either to make mistakes, or to fail to prevent them, with a high error rate in high acuity settings, including the operating room (OR). While overall safety in ambulatory anesthesia is excellent, basic medical safety issues still remain, said Dr Lucinda L Everett (Boston, MS), and risk relates to patient factors as

well as procedure factors. For example, refinement of anesthetic and pain management techniques has allowed a broader range of procedures to be done in the ambulatory setting, as well as a broadening of patient acceptance criteria.

Data from the ASA Closed Claims Project provide interesting insights into outcomes in ambulatory anesthesia. For example, damaging events were cardiac or respiratory in nature in a similar proportion of ambulatory and inpatient claims, but the injury severity overall was lower in ambulatory patients, with more temporary or non-disabling injuries. Claims related to office-based procedures were associated with a significantly higher proportion of deaths compared with the ambulatory setting, presumably due to lack of support and/or equipment in the office.

Efforts to provide incentives to improve quality and safety in medicine include pay-for-performance initiatives, as developed by private industry, insurers, and governmental agencies. Initiatives being considered for OR anesthesiology include timely administration of antibiotic prophylaxis, and maintenance of normothermia in procedures exceeding 60 min. Additional measures might include patient safety protocols or use of electronic records, said Dr Everett. Appropriate data should also be collected to validate choice of measures.

Use of propofol for sedation by non-anesthesiologists – the need for caution



Hector Vila, Raafat S Hanallah, Rafael Miguel & Beverly K Philip

The need for guidelines

Propofol is in widespread use by non-anesthesiologists as a sedative because of its rapid speed of onset and short recovery time. However, according to Professor Beverly K Philip (Boston, MA; Moderator), this has

led to increased patient morbidity and mortality because of a lack of qualified anesthetists to deal with any complications. The challenges are to maintain patient safety by ensuring that sedation is fully defined and understood, and that appropriate guidelines are in place for the use of propofol.

According to the ASA there is a continuum between sedation and general anesthesia as defined by the patient's level of responsiveness. During deep sedation/analgesia patients are able to make purposeful responses only after repeated or painful stimulation (not to be confused with reflex withdrawal). Anesthetized patients are unarousable, cannot respond purposefully even after a painful stimulus, and may require airway management. Although propofol is an effective agent, it has the potential to induce rapid and profound changes in the depth of sedation and anesthesia and no antagonist is available.

The physician responsible for the use of propofol should be trained in medical complications and proficient in airway management.

The ASA is currently reviewing its policies on training and credentials for deep sedation. Until the ASA reports, practitioners should note the following joint statement released in April 2004 by the American Association of Nurse Anesthetists (AANA) and the ASA; "Whenever propofol is used for sedation/anesthesia, it should be administered only by persons trained in the administration of general anesthesia, who are not simultaneously involved in these surgical or diagnostic procedures..." Failure to follow these recommendations could put patients at increased risk of significant injury or death.

Deep sedation credentialing for non-anesthesiologist physicians: the Florida regulatory experience

Professor Rafael Miguel (Tampa, FL) explained that the Florida Board of Nursing has made it clear that, "administration of propofol and/or monitoring of a patient who has received propofol is an advanced act", and cannot be carried out by registered nurses (RNs). Anesthesia is usually well supervised in hospitals and in ambulatory surgery centers, but office-based surgery often lacks professional support and infrastructure. Furthermore, plastic and cosmetic surgeons usually do not have anesthesiology credentials. In 1999, the first anesthesiologist was appointed to the Florida Board of Medicine and 5 months later Florida became the first state to require an anesthesiologist for office-based general anesthesia. Waivers have since been introduced, initially for self-accredited state organizations, but national anesthesiology accreditation for those carrying out office-based surgery is now required. However, the ASA and AANA still oppose the Nursing Assistive Personnel Scheme (NAPS), which allows the presence of only a trained nurse capable of resuscitating a patient from general anesthesia/severe respiratory depression. Office-based surgery will continue to grow and its procedures require regulation.

(Mis)adventures from the Sunshine State

Dr Hector Vila (Tampa, FL) reported on six propofol-related deaths during office-based surgery in Florida between 2002 and 2005. Five of the patients were undergoing plastic surgery and one was undergoing eye

surgery. In all cases surgeons and RNs were involved, but cardiovascular and respiratory management was poor, as were practice emergency procedures. One patient was under deep sedation, had an unmanaged airway and no anesthetic monitoring. Dr Vila took the view that health professionals qualified in cardiopulmonary management and emergency protocols for recovery from anesthetics should always be available in office-based practices. In addition, there should be better patient selection and evaluation before surgery.

Deep sedation with propofol for pediatric magnetic resonance imaging: anesthesiologists and registered nurses team up for safety

Children undergoing magnetic resonance imaging require propofol sedation to keep them still, according to Professor Raafat S Hanallah (Washington, DC). If children are deeply sedated then this will have an effect on the airway, sometimes leading to obstruction. At the Children's National Medical Center, a team that includes an anesthesiologist, sedation nurse and radiologist is present to ensure the safety of the child while undergoing these procedures. The sedation nurses are well trained in acute care and anesthesiology. All the children have CO₂ monitors, the sedation nurses remain with the child throughout the procedure and the anesthetist is available immediately if needed and the procedure is safe, simple, fast and efficient. Over 2500 cases are treated annually and there have been no major complications. The process has been initiated and supervised by anesthesiologists.

Ambulatory surgery in the patient with sleep apnea

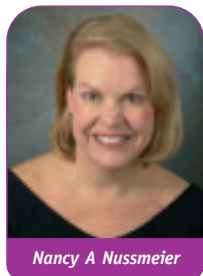


Girish P Joshi

Assessment of the suitability of patients with obstructive sleep apnea (OSA) for ambulatory surgery should take into account a whole range of factors, said Professor Girish P Joshi (Dallas, TX). These include severity of OSA, presence of co-existing disease, invasiveness of the surgical procedure, type of anesthetic technique, and the outpatient surgery center facilities. In the recently published ASA Practice Guidelines, the consensus was that ambulatory surgery should be acceptable for OSA patients undergoing superficial or minor orthopedic surgery under local block or block without sedation, but not for those scheduled for airway or upper abdominal laparoscopic surgery. Under other circumstances however, opinion was equivocal, such as for minor orthopedic surgery under general anesthesia, or moderate peripheral surgery under local anesthesia and moderate sedation.

Professor Joshi suggested a number of strategies to optimize conditions for OSA patients, such as pre-operative treatment of OSA, use of local or regional anesthesia during surgery, reduced use of opioids, selection of a general anesthesia technique that allows early return of airway reflexes and cognitive function, and induction/intubation with the head and shoulders elevated. In order to minimize the risk of post-operative residual muscle paralysis, the smallest possible dose of relaxants should be used, and reversal agents given unless there is unequivocal evidence of adequate recovery. Patients should not be discharged from the PACU until they are awake, alert, oriented and able to move all limbs, said Dr Joshi. They should also be hemodynamically stable, with oxygen saturation breathing room air returned to $\pm 2\%$ of baseline values, and have minimal pain or post-operative nausea and vomiting. Before being allowed home, these patients should be monitored for around 3 h longer than non-OSA patients, and for 7 h after the last episode of obstruction or room air hypoxia. Patients should be admitted to hospital if they had a difficult intra- or post-operative course, cannot control their post-operative pain without parenteral opioids, or have severe OSA with significant comorbidities. "When in doubt, admit," he concluded.

Racial and gender outcome differences in cardiovascular anesthesia and medicine



Nancy A Nussmeier

Outcomes in women

Professor Nancy A Nussmeier (Syracuse, NY) explained that cardiovascular disease (CVD) is the leading cause of death in women in the US: one in every two women will die of CVD and the risk of developing CVD increases two- to four-fold after the menopause. Since 1979 the incidence of CVD-related mortality has decreased more in men than in women. Women need to become aware of the need to stop smoking, reduce their weight and cholesterol levels, and increase their physical activity.

Unfortunately, women with CVD usually present for treatment later than men, by which time their disease is often more diffuse, making intervention more difficult. African-American women are at increased risk of developing CVD, perhaps because of socioeconomic factors and late referral, which usually results in a poorer prognosis. First-line therapy for CVD includes aspirin, β -blockers, and statins. However, these therapies are underused in women.

In 2005, gender-specific practice guidelines for coronary artery bypass graft (CABG) were published (Ann Thorac Surg. 2005;79:2189-2194). Risk factors for increased mortality in women after CABG include age, small body surface area (BSA) (and thus small coronary arteries), being African American or Hispanic, and pre-operative risk factors such as diabetes, obesity, unstable angina and hypertension. After allowing for BSA, women have a 22% higher post-CABG mortality rate than men, but this is higher still for small, obese women and for younger women (aged <50 years), who have a mortality rate about three times higher than men.



John E Ellis

Outcomes in African Americans

African Americans are at a greater risk of developing CVD and have a shorter life-span than other Americans, according to Professor John E Ellis (Chicago, IL). In addition, there are disparities in the diagnosis and referral of African Americans, who are less likely to be referred for cardiac catheterization than Caucasians. The reasons for this are complex, but could include racism, or that African Americans are less likely to agree to the procedure if offered, and are less likely to have coronary artery disease amenable to revascularization. Following CABG surgery, mortality rates after 1 year are greater in African Americans than Caucasians.

Professor Ellis then discussed the findings of the Perioperative Genetics and Safety Outcomes Study (PEGASUS) carried out between 1996 and 2002 in 2104 patients, which showed that race is not associated with genetic polymorphisms for post-operative myocardial infarction, stroke or hemorrhage after cardiac surgery. However, PEGASUS revealed that African-American patients with congestive heart failure had a less active renin-angiotensin system and lower bioavailability of nitric oxide (NO) than white patients. This correlates with an endothelial NO synthase polymorphism. Augmentation of NO may slow or reverse progressive heart failure. Renal failure is more common in African-American than Caucasian patients and up to six gene polymorphisms may be involved, including interleukin (IL)-6 and angiotensinogen variants. A similar situation exists with regard to respiratory failure, where there is an association between race and angiotensin converting enzyme (ACE) polymorphisms, which are associated with heart failure, leading to respiratory failure and to patients requiring mechanical ventilation. A potential mechanism for these complications is the release of inflammatory mediators, including tumor necrosis factor (TNF), IL-6, IL-8 and angiotensin II, which cause ischemia-reperfusion injury. Reducing the disparities between races is difficult, but application of genetic testing to target therapy would enhance the treatment of both African Americans and other ethnic groups.

We are what we make



Jerry Reves

Dr Jerry Reves (Charleston, SC) presented this year's Emery A Rovenstine Memorial Lecture. He made it clear that, although academic departments of anesthesiology encompass education and clinical services, too many fall short in the clinical research area. Currently, only 40% of the 128 accredited anesthesiology departments receive research funding from the National Institutes of Health (NIH), and 48% of the funding is concentrated in only 10 departments. According to Dr Reves, our research vision should be that, "Anesthesiology attracts, educates, supports and retains many individuals who advance the field, and all medical science, through scholarly research." To achieve this goal, residents who wish to undertake research must be recruited, actively encouraged and mentored during their 4-year residency. In parallel, faculty members who are active in research should also be appointed,

with adequate time, space and funding provided for them. There are many research areas deserving of attention by anesthesiologists, including the areas of neuroscience, pharmacogenetics and pain, but this can only happen "once the commitment is made to integrate research fully into anesthesiology," and then funding will follow.



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56 Livingston Avenue
Roseland
NJ 07068
USA

Editorial board:

Professor Francois Donati
Directeur de Recherche
Université de Montréal - Anesthésiologie
Département d'Anesthésiologie de l'Université de Montréal
Faculté de Médecine
C.P. 6128, Succursale Centre-Ville
Montréal, Quebec H3C 3J7
Canada

Professor Rajinder K Mirakhor
Professor, Anaesthetics & Intensive Care Medicine
Department of Anaesthetics
Whitla Medical Building
97 Lisburn Road
Belfast BT9 7BL
UK

Your comments and suggestions please

Please send your comments on this issue of *aspects in anesthesia* and suggestions for future issues to:

Professor Bill Winlow
Managing Editor, *aspects in anesthesia*
Prime Medica Ltd
Mere House, Brook Street, Knutsford
Cheshire WA16 8GP, UK
e-mail: bill.winlow@prime-medica.com

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Tel: +44 (0) 1565 752 100
Fax: +44 (0) 1565 752 121
www.prime-medica.com



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